

What is claimed is:

1. A method for making photonic polymer-blend structures having tunable optical and mechanical properties comprising the steps of:
  - a) providing an aqueous polymer-blend solution comprising a relative mass fraction of polyethylene glycol and polyvinyl alcohol wherein said solution having a sufficient water and polymer blend ratio to form polymer-blend spherical microparticles having specific properties and morphology to enable said microparticles to partially merge in a sequential attachment with one another to form an inter-particle bond having an inter-particle separation wherein said specific properties and morphology of said microparticles tune said inter-particle separation and wherein said specific properties and morphology of said spherical microparticles produce a desired photonic polymer-blend structure having a desired architecture;
  - b) injecting said aqueous polymer-blend solution into a particle focusing device at a sufficient rate so to form individual droplets of solution;
  - c) controlling said parameters of said particle focusing device to allow said droplets to be spatially focused and guided through said particle focusing device to form spherical microparticles partially merged in a sequential attachment in an inter-particle bond with one another and having a tuned inter-particle separation; and
  - d) depositing said spherical microparticles in a precise placement on a collection device forming a desired architecture of said photonic polymer-blend structure.
2. The method of Claim 1 wherein said polyethylene glycol and said polyvinyl alcohol is in a 4:1 mass ratio.
3. The method of Claim 1 wherein homogeneous polymer-blend spherical microparticles are formed having diameters ranging from 1-10  $\mu\text{m}$ .
4. The method of Claim 1 wherein said inter-particle separation is tuned by adjusting said relative mass fraction of said polymer-blend material.
5. The method of Claim 1 wherein said aqueous polymer-blend solution further comprises an ionic species.
6. The method of Claim 1 wherein said particle focusing device is an electric quadrupole.